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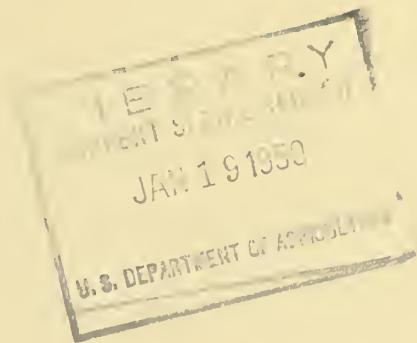
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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Bureau of Plant Industry, Soils
and Agricultural Engineering



H. T. & S. Office Report No. 219

Storage of Florida Oranges
Orlando, Florida-1949

By

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Division of Fruit and Vegetable Crops and Diseases

Report of a study made under the
Research and Marketing Act of 1946
Project No. 413

November 1949
Orlando, Florida



1/
STORAGE OF FLORIDA ORANGES

Orlando, Florida - 1949

This is a report of the 1949 storage experiments with Valencia oranges conducted at Orlando, Florida. The tests were part of the investigations on the storage of citrus fruits conducted by the Bureau of Plant Industry, Soils and Agricultural Engineering and the Refrigeration Research Foundation.

Material and Methods

The fruit for all of these studies were obtained from the Chase and Company's Isleworth Grove located at Windermere, Florida.
2/
The oranges were of the Valencia variety and were grown on rough lemon rootstock.

1/ Personnel engaged: Paul L. Harding, M. Bryan Sunday, Randall H. Cubbedge, G. Lee Roberts, and Georgine Roberts.

2/ Acknowledgement is due Randall Chase, Sydney Chase, Frank Chase and Corbett Hutchinson for their generous cooperation.

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Storage tests were made on fruit from two different pickings, in order to determine the effects of different maturities on storage quality. Pick #1 was made April 26, while Pick #2 was made about one month later, on May 23, 1949. The fruit in the two pickings were given the same prestorage treatments and were subjected to the same periods in storage. In addition, other tests were made in which packed boxes of oranges were kept at 50° and 70°F. for one week and then stored at 32° and at 38°.

Prestorage treatments consisted of:

- (a) Borax plus diphenyl wraps
- (b) Naked pack and phenodor case liners
- (c) Plain untreated citrus wraps (control)

The fruit was limited to sizes 150, 176, and 200, and all of the tests were made with 2-box lots. The storage temperatures were about 32° and 38°F. The condition of the fruit was determined at the end of 8, 12, and 16 weeks, and again after a one week holding period at 70°.

The average temperature and humidity in the storage rooms were determined by averaging the daily readings taken at midnight obtained by self-recording hygro-thermographs. The 32° cold storage room actually averaged 32.8°F. and 81.5 percent humidity; the 38° cold storage room, 38.2° and 87 percent humidity; the 50° curing room, 48.4° and 84 percent humidity; and the 70° holding room, 68° and 86 percent humidity.

At the time of the first inspection the diphenyl wraps, the phenodor liners and the plain wraps were removed and discarded. The fruit was examined for evidence of decay and skin breakdown. Decayed fruits were removed and the sound oranges repacked, and the boxes of fruit set in a storage room maintained at 70°F. A final inspection was made at the end of the seven-day period, after which samples of oranges were taken for chemical analyses.

Chemical analyses of the fruit were made to determine the changes taking place in composition during the storage and holding periods. Determinations were made of the total solids, total acid, ascorbic acid (vitamin C), volume of juice and flavor or taste. Also, each sample of juice was tested for aging using the common "Benzidine Method." Since no color reaction was obtained, the data are not included in this report. All analyses were made on the composited juice from 25 oranges of size 150.

The data are shown in tables 1 to 24.

RESULTS

1st Picking (April 26, 1949)

A comparison of the 1948 and the 1949 storage data showed there was a much smaller amount of decay in 1949.

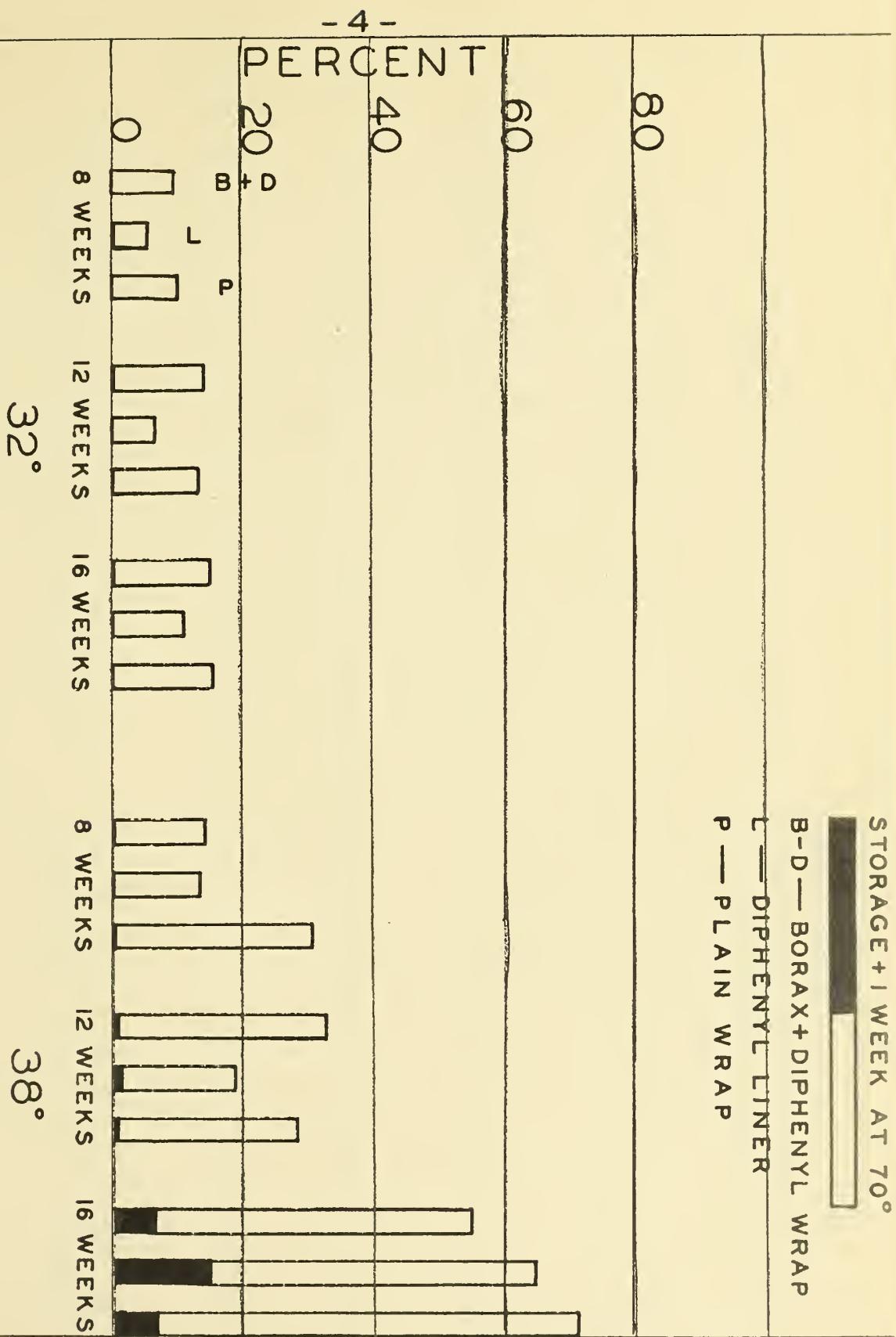


FIG. I EFFECT OF TREATMENTS ON TOTAL DECAY

VALENCIAS R.L. PICKED APRIL 26, 1949

STORAGE + 1 WEEK AT 70°

B-D — BORAX + DIPHENYL WRAP

L — DIPHENYL LINER

P — PLAIN WRAP

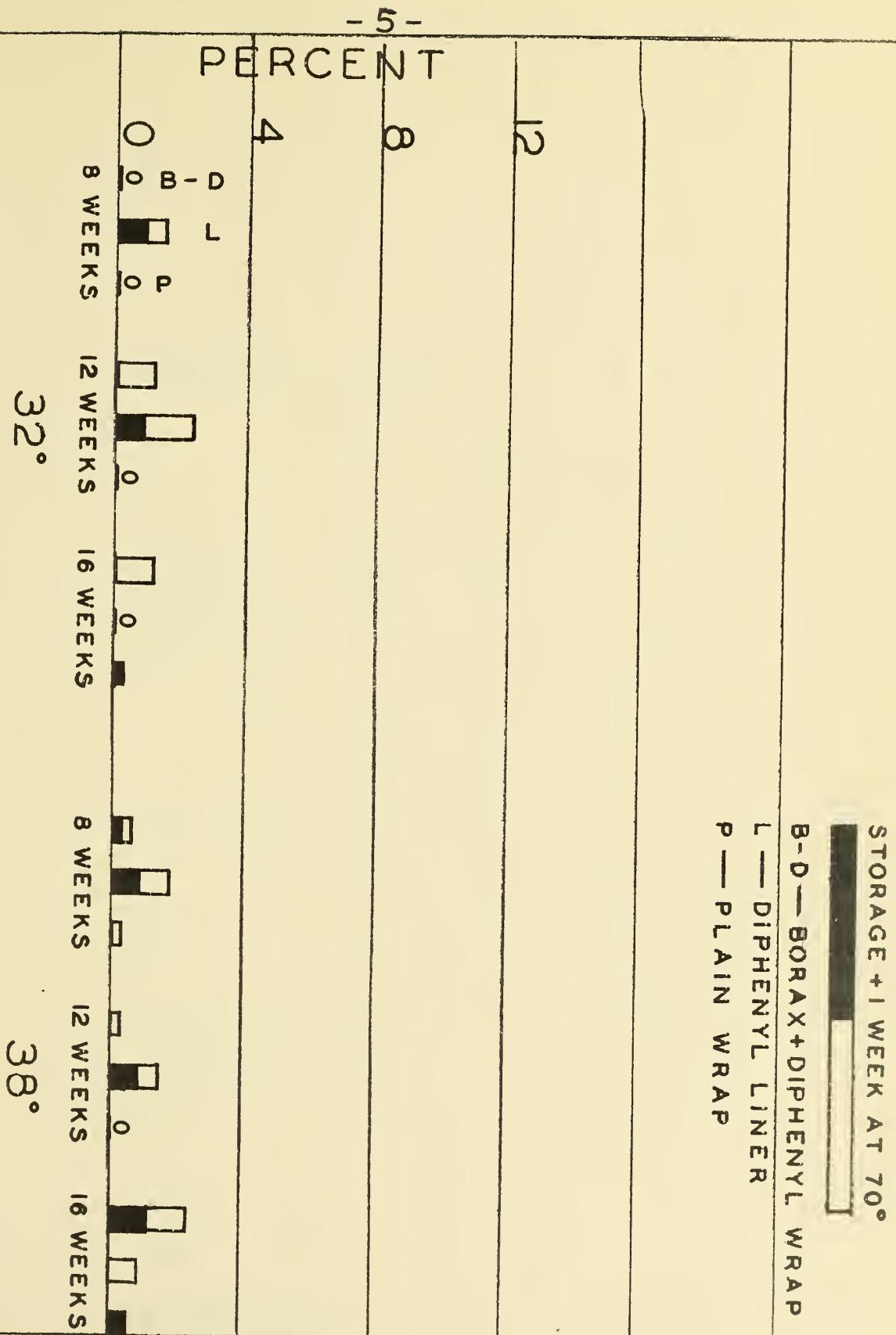


FIG. 2 EFFECT OF TREATMENTS ON PITTING(MODERATE & SEVERE)

VALENCIAS R. L. PICKED APRIL 26, 1949

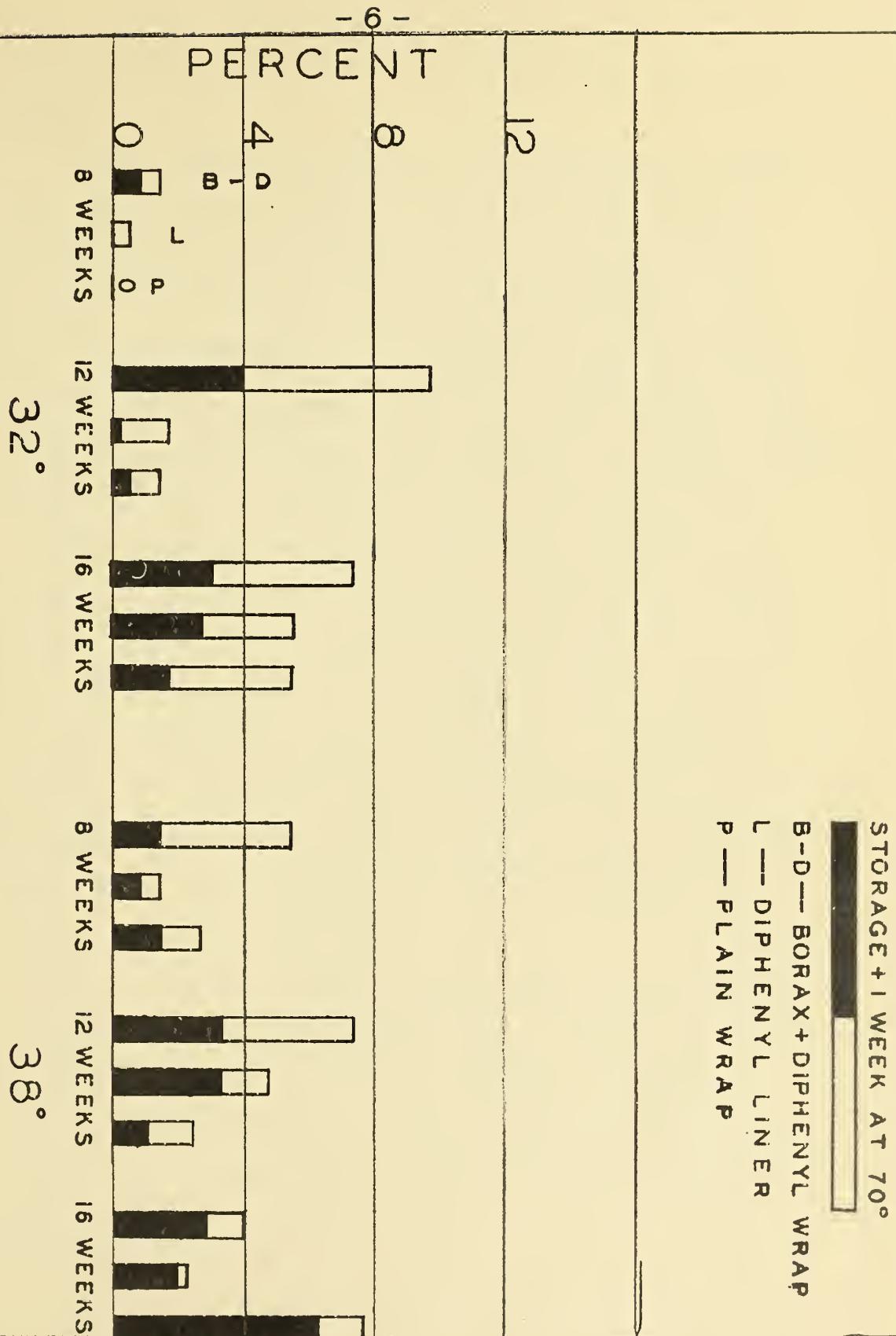


FIG. 3 EFFECT OF TREATMENTS ON AGING (SEVERE)
VALENCIAS R.L. PICKED APRIL 26, 1949

Effect of storage temperature on decay, pitting, and aging.

1st Picking:

It will be observed in figure 1, that insignificant to moderate amounts of decay developed during 8, 12, and 16 weeks storage at 32° and at 38°F. Most of it developed during the seven-day holding period at 70°. The percentages of decay were smaller for the fruit stored at 32° than that stored at 38°. The amount of decay was correlated with the prestorage treatments, there being less in the fruit packed in boxes that contained phenodor case liners than in the fruit treated with borax and wrapped in diphenyl wraps and the fruit in plain wraps.

Skin breakdown in the form of storage pits or aging was of minor commercial importance. It will be seen in figure 2 that usually less than 2 percent of the fruit was affected with moderate and severe pitting. Prestorage treatments had some effect on the development of pits, the best results being obtained when the fruit was wrapped in plain untreated citrus wraps and the most pits developing on the fruit packed in phenodor case liners. However, in these lots the percentages were small. There was no significant differences in the amount of pitting that developed at 32° and 38°F.

The percentages of fruit that showed aging were not high, but were somewhat greater than those showing pitting. In figure 3 it will be observed that the amount of aging that developed in storage was about equal to that developing during the one week holding period at 70°F. Phenodor liners usually gave the best results but the data were not always consistent.

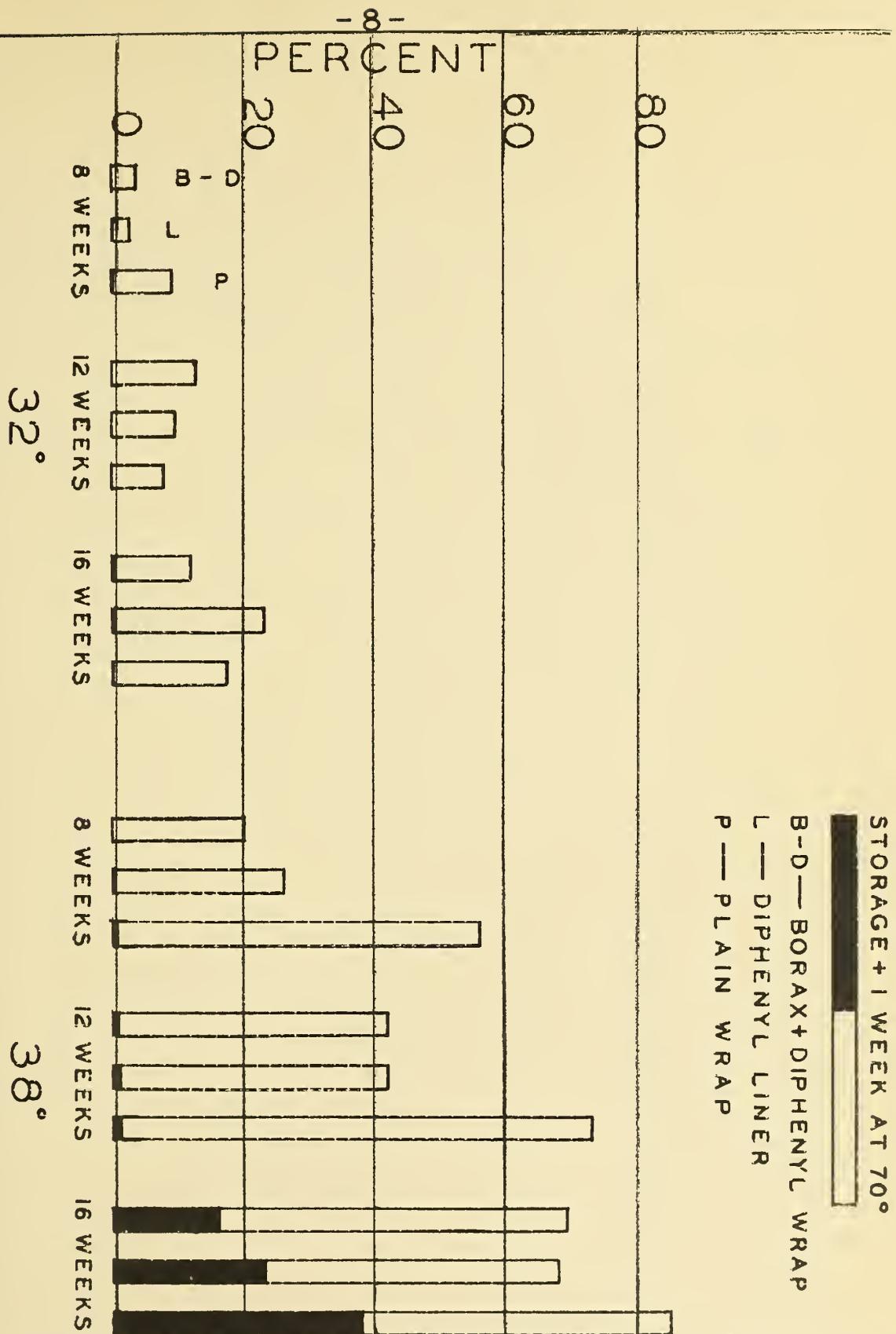


FIG. 4 EFFECT OF TREATMENTS ON TOTAL DECAY
 VALENCIAS R. L. PICKED MAY 23, 1949

STORAGE + 1 WEEK AT 70°

B-D— BORAX + DIPHENYL WRAP

L— DIPHENYL LINER

P— PLAIN WRAP

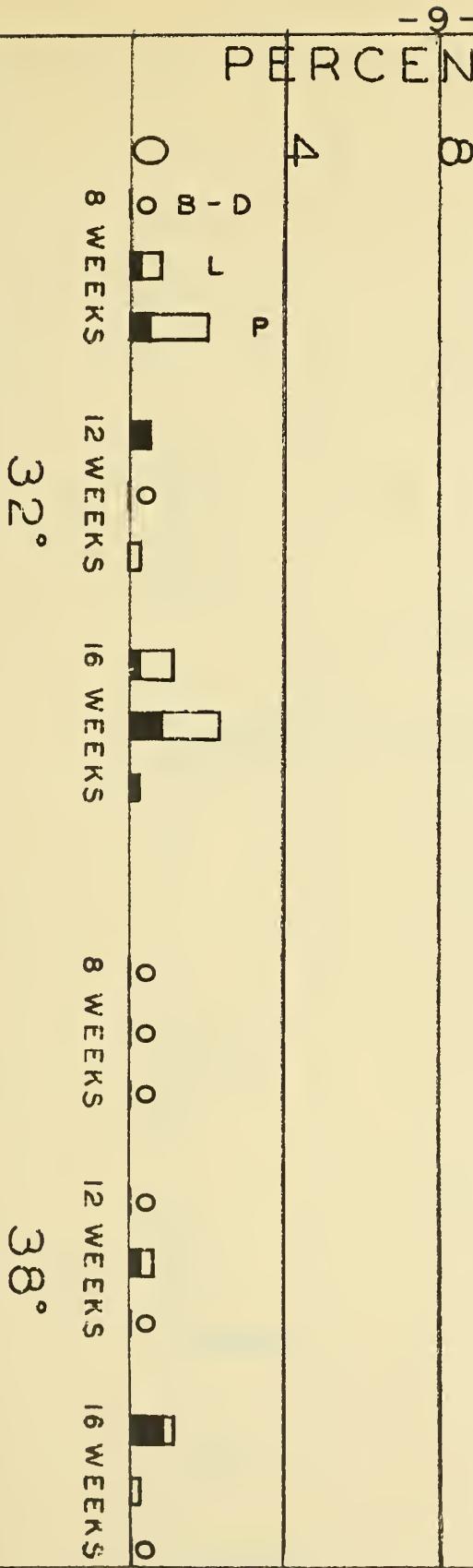


FIG. 5 EFFECT OF TREATMENTS ON PITTING(MODERATE & SEVERE)

VALENCIAS R. L. PICKED MAY 23, 1949

STORAGE + 1 WEEK AT 70°

B-D—BORAUX + DIPHENYL WRAP

E—DIPHENYL ETHER

P—PLAIN WRAP

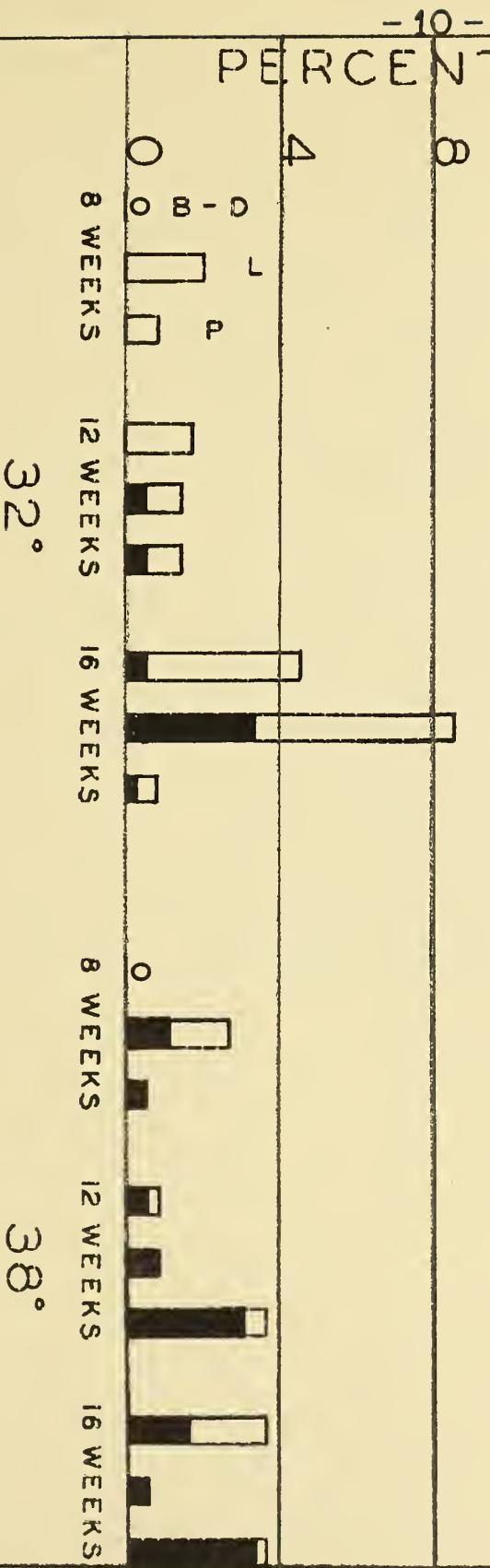


FIG. 6 EFFECT OF TREATMENTS ON AGING(SEVERE)

VALENCIAS R. L. PICKED MAY 23, 1949

2nd Picking (May 23, 1949)

This picking was made about one month after the first and the fruit of both pickings were given the same prestorage treatments and subjected to similar periods in storage. The differences in total decay between the pickings were small and somewhat variable. However, there was slightly more decay in the 1st picking than in the 2nd picking, especially in the lots stored at 32° for 8 and 12 weeks. In the 2nd picking there was slightly more decay in the lots stored at 32° for 16 weeks and for those stored at 38° for 8, 12, and 16 weeks.

In the second picking, skin breakdown in the form of storage pitting was commercially unimportant (fig. 5). The results show that practically no pitting developed on the fruit in 38°F. storage, and only to a slight degree in 32° storage. Prestorage treatments did not appear to influence the small amount of pitting found.

The percentages of fruit that showed aging (fig. 6) were small, and were somewhat lower than that found in Pick #1 (fig. 3). No correlation was found between aging and the prestorage treatments.

STORAGE + 1 WEEK AT 70°

B-D — BORAX + DIPHENYL WRAP

D — DIPHENYL LINER

P — PLAIN WRAP

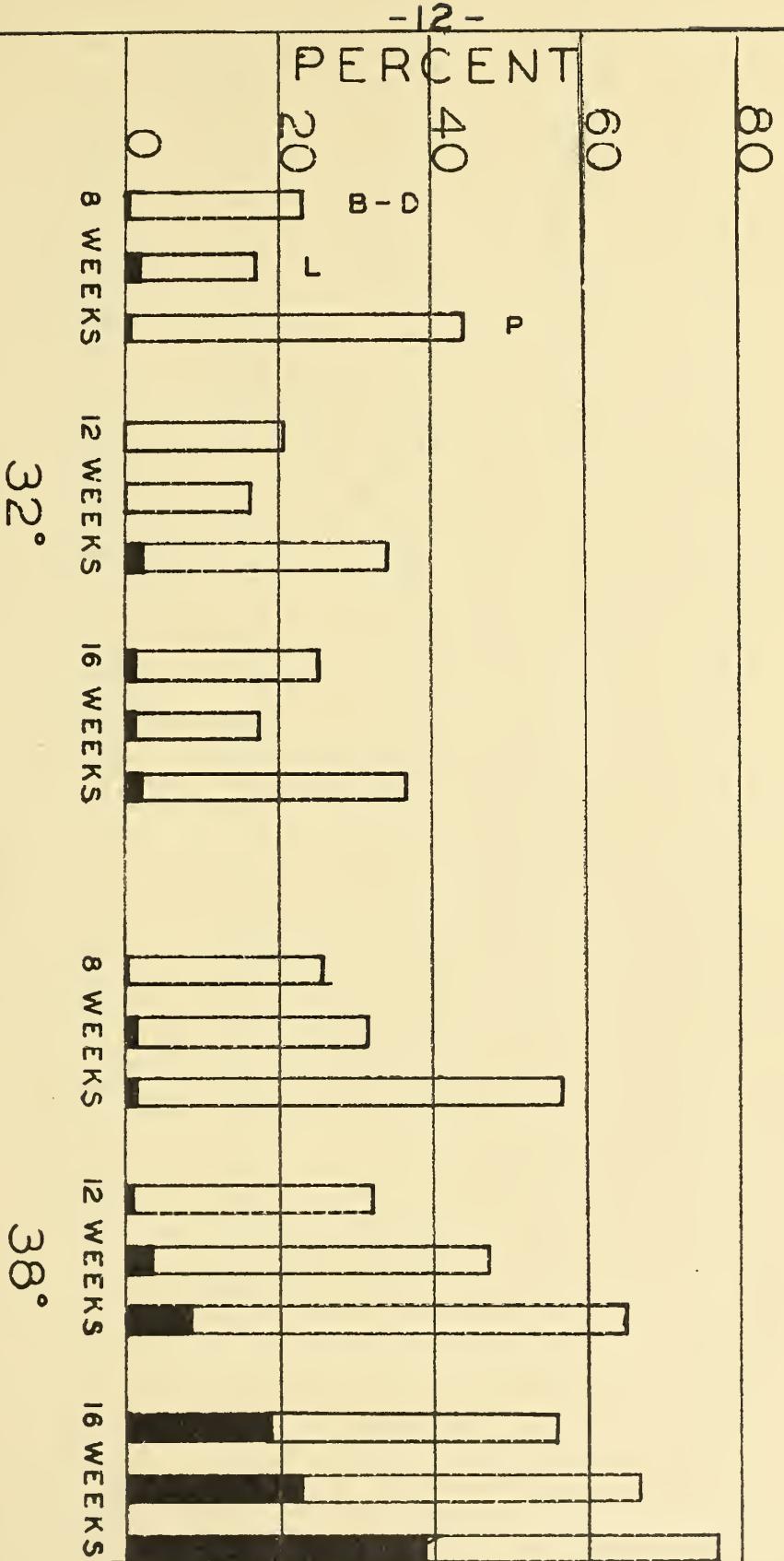


FIG. 7 CURING 1 WEEK AT 50° ON TOTAL DECAY

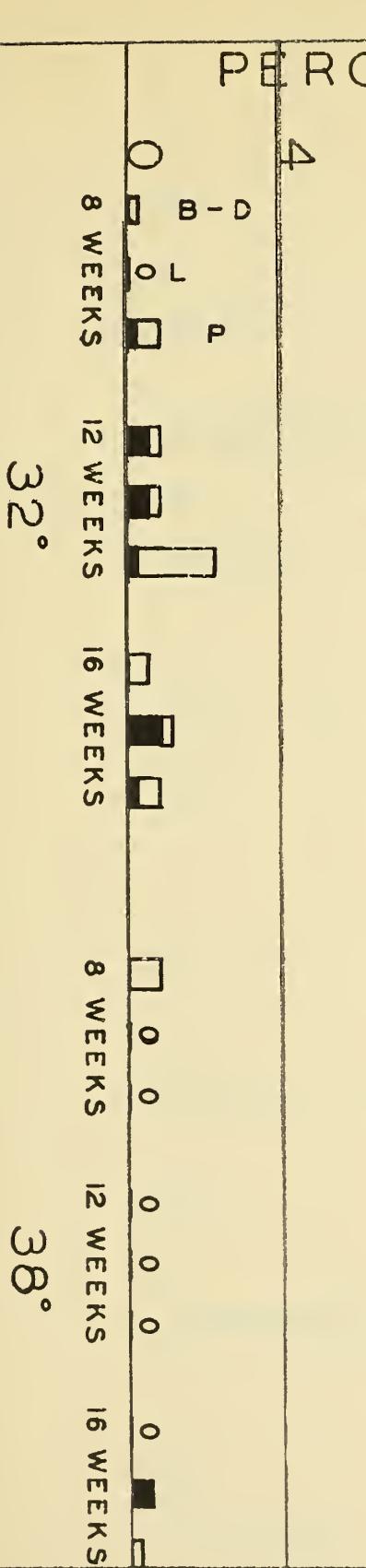
VALENCIAS R. L. PICKED APRIL 19, 1949

STORAGE + 1 WEEK AT 70°

B-D — BORAX + DIPHENYL WRAP

L — DIPHENYL LINER

P — PLAIN WRAP



32°

38°

FIG. 8 CURING 1 WEEK AT 50° ON PITTING(MODERATE & SEVERE)
VALENCIAS R. L. PICKED APRIL 19, 1949

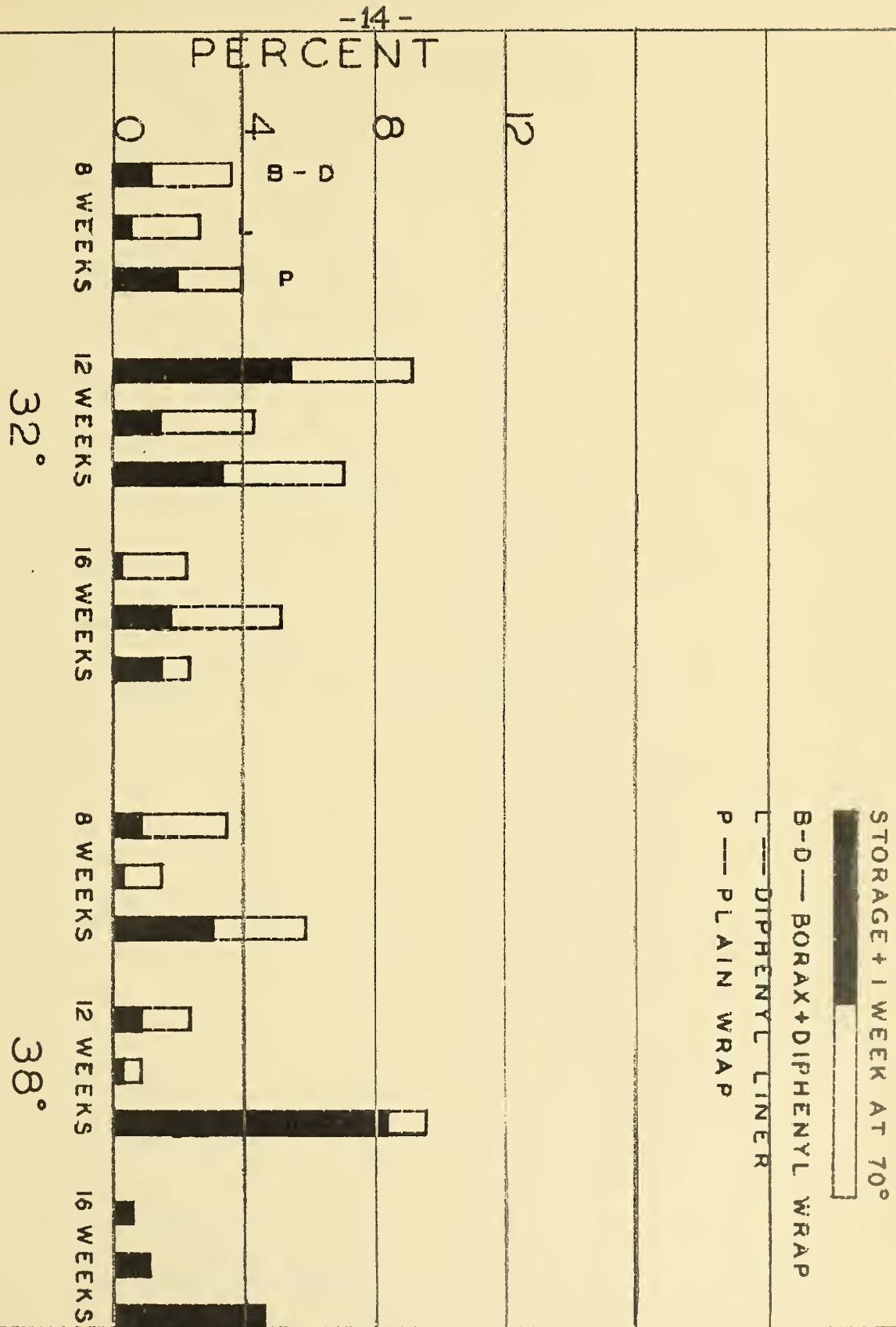


FIG. 9

CURING 1 WEEK AT 50° ON AGING (SEVERE)
 VALENCIAS R. L. PICKED APRIL 19, 1949

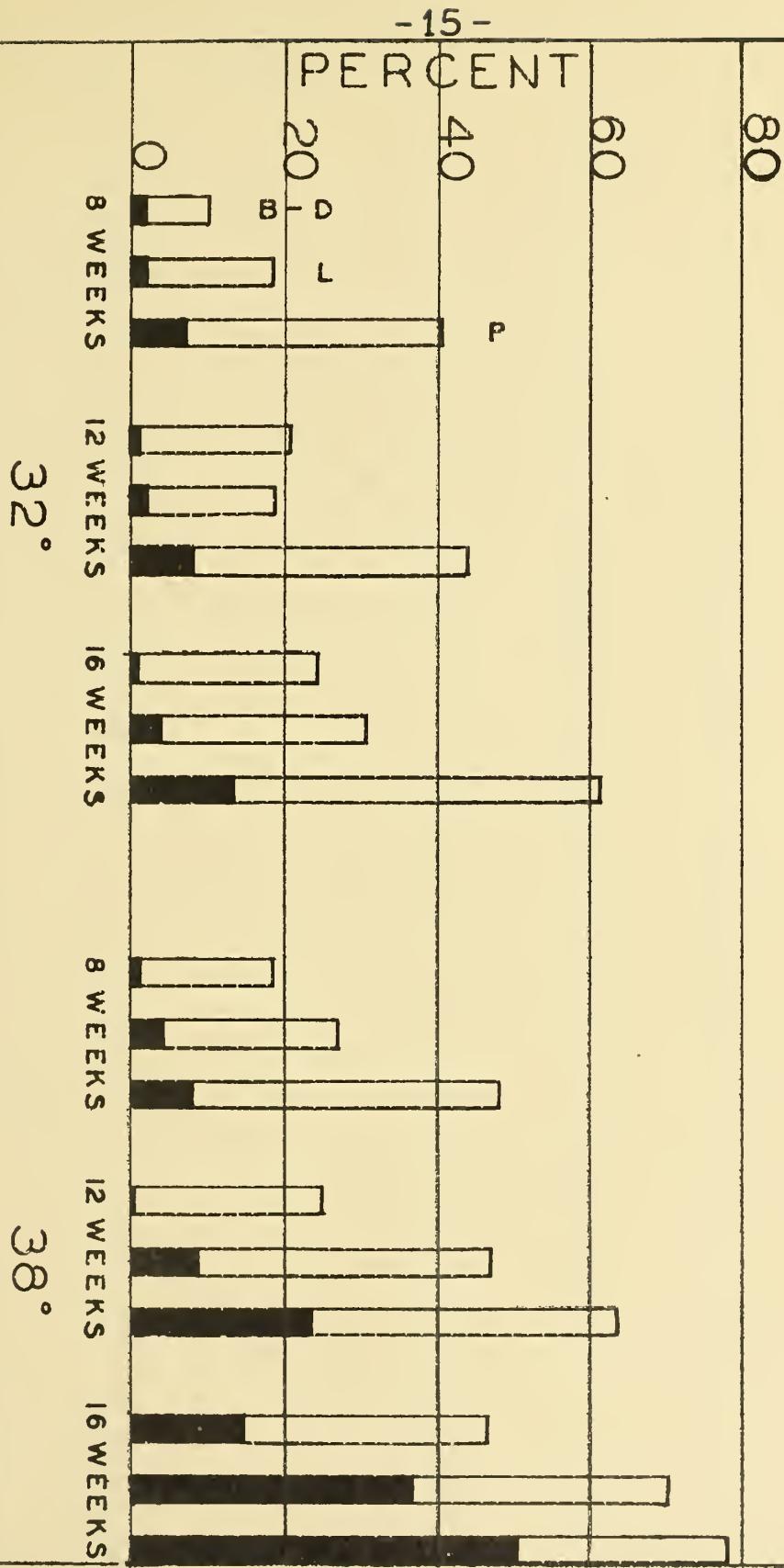


FIG. 10

CURING 1 WEEK AT 70° ON TOTAL DECAY
VALENCIAS R. L. PICKED APRIL 19, 1949

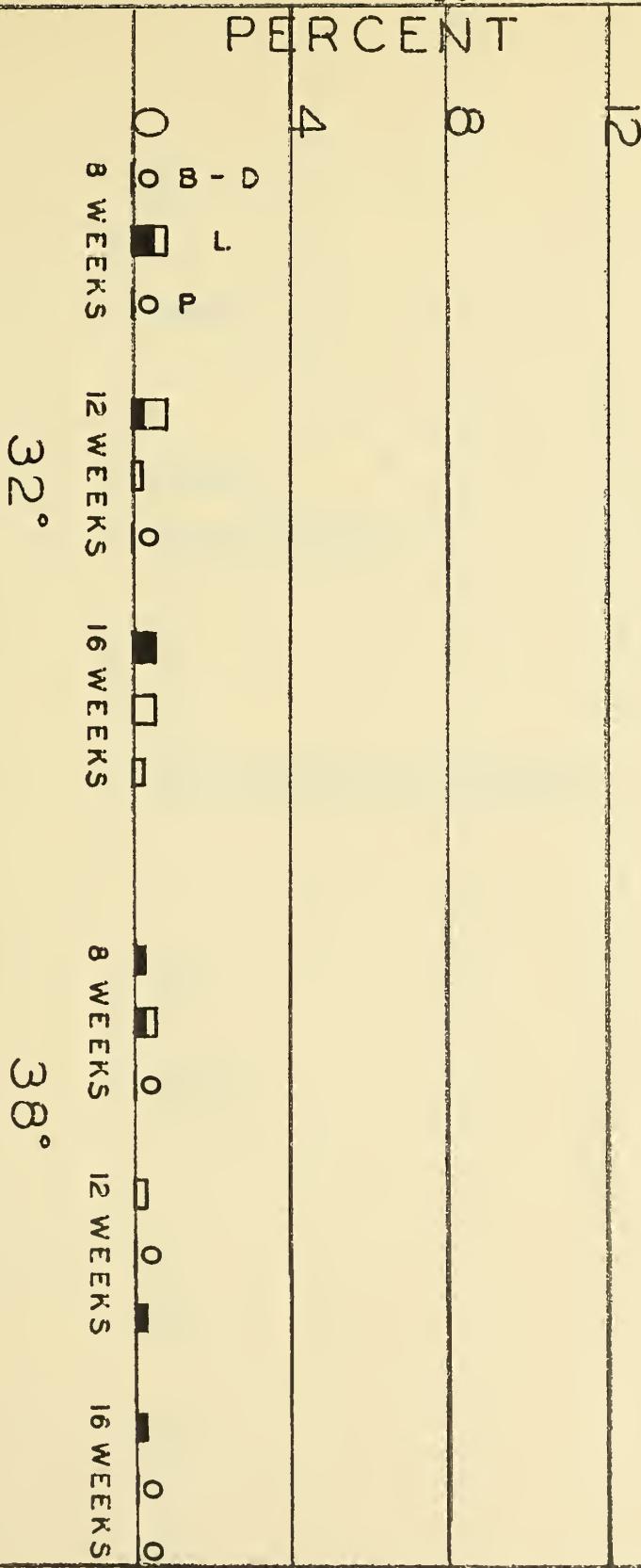
STORAGE + 1 WEEK AT 70°

B-D — BORAX + DIPHENYL WRAP

L — DIPHENYL LINER

P — PLAIN WRAP

-16-



32°

38°

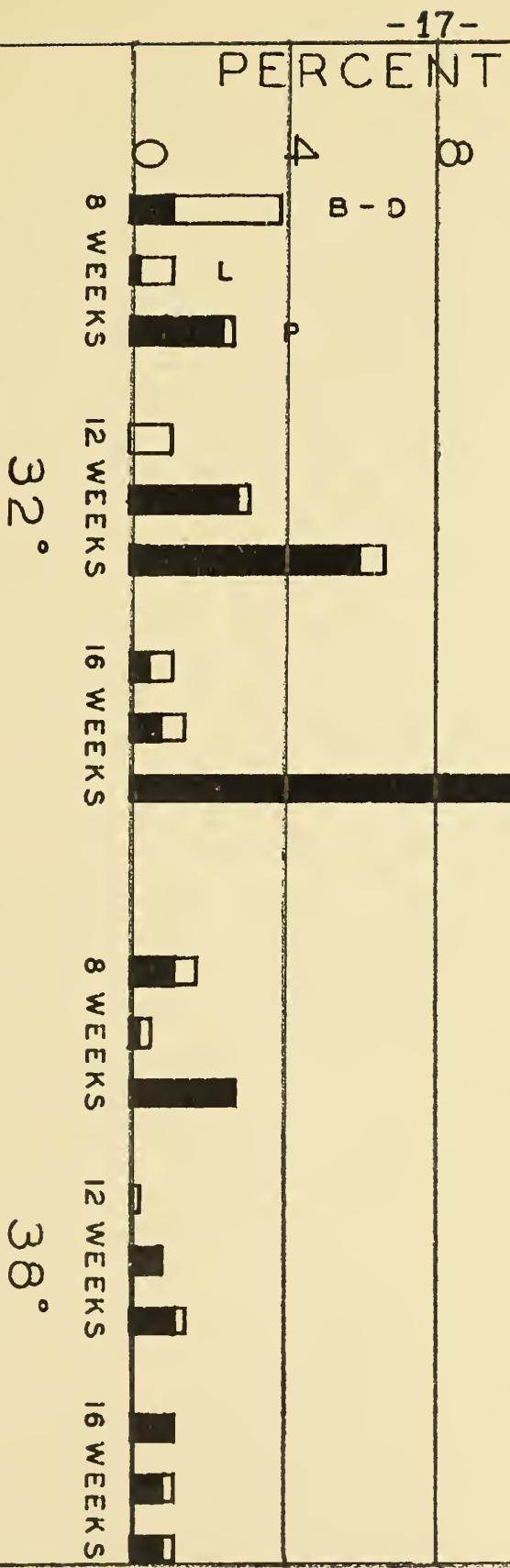
FIG. II CURING 1 WEEK AT 70° ON PITTING(MODERATE & SEVERE)
VALENCIAS R. L. PICKED APRIL 19, 1949

STORAGE + 1 WEEK AT 70°

B-D — BORAX+DIPHENYL WRAP

L — DIPHENYL LINER

P — PLAIN WRAP



32°

38°

FIG. 12 CURING 1 WEEK AT 70° ON AGING(SEVERE)
VALENCIAS R. L. PICKED APRIL 19, 1949

Effect of curing before storage

The purpose of the tests was to determine whether or not preliminary storage at 50° or 70° F. would render the fruit to be less susceptible to rind breakdown and decay during subsequent storage at the regular temperatures. In 1948 the amount of decay was smaller in the fruit stored at New York City than in comparable lots stored at Orlando, Florida, which suggested that beneficial effects may have resulted from the higher temperature during the period in transit.

In the 1949 tests curing at 50° F. had no beneficial effect on the subsequent control of decay as may be seen by comparing figure 7 with figure 1. In fact, more decay developed in the cured than in comparable lots placed immediately in cold storage. Curing at 50° for one week did result in a slight lowering of storage pitting (fig. 8), but there was not consistent effect on aging (fig. 9).

The data presented in figure 10 show that curing at 70° F. resulted in a slight increase in decay when compared with curing at 50° (fig. 7) or immediate cold storage (fig. 1). The best control of decay was obtained by the prestorage treatments of borax plus diphenyl wraps and phenodor case liners. Plain citrus wraps gave the poorest control. Curing at 70° did result in a slight but general decrease in storage pits (fig. 11) and in some, decrease in aging, especially in the fruit stored at 70°.

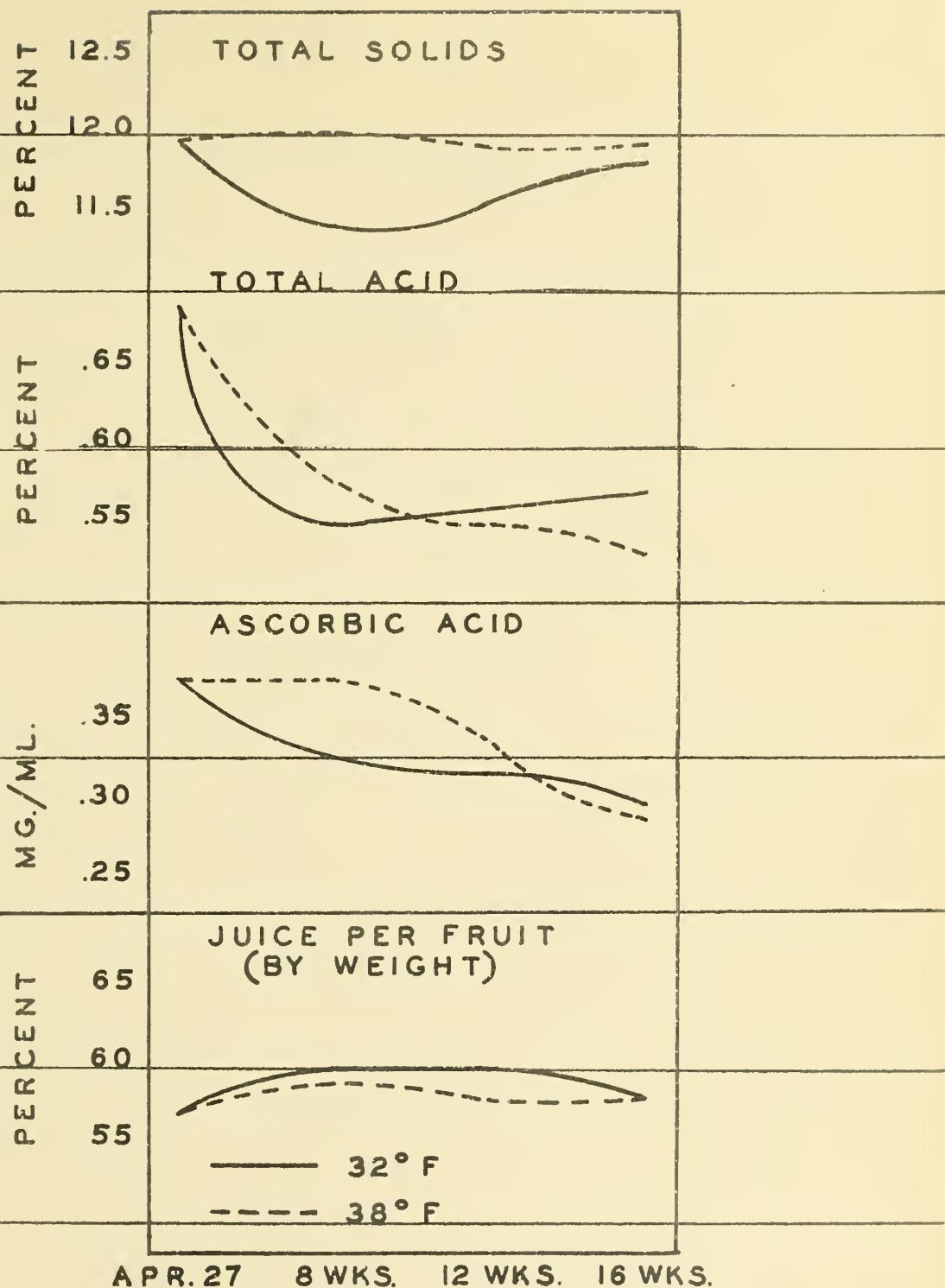


FIG. 13 CHANGES IN THE COMPOSITION OF VALENCIA
ORANGES IN COLD STORAGE. (AVERAGES OF
ALL TREATMENTS, PICK I, 1949 FOR SIZE 150 ONLY)

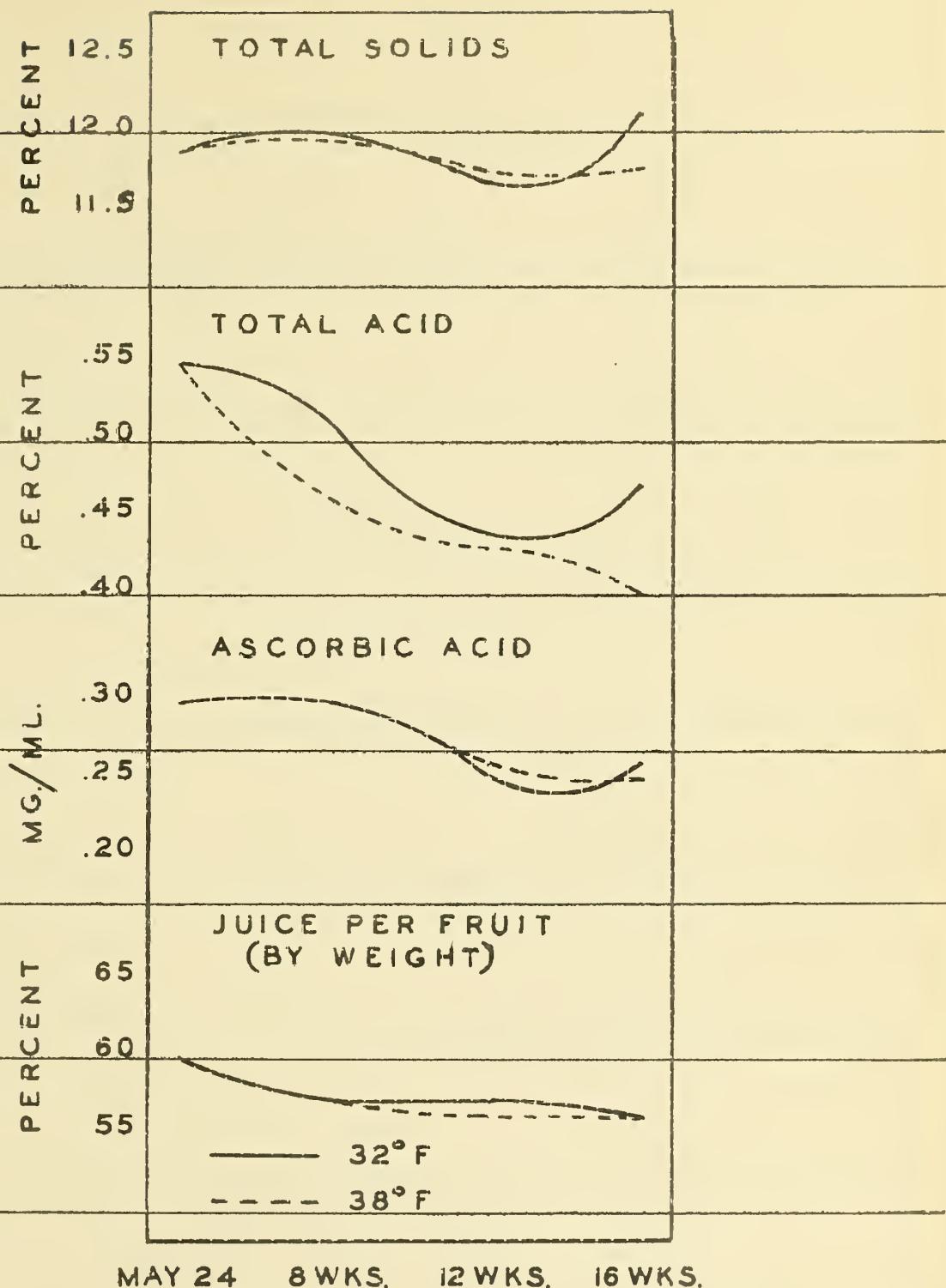


FIG. 14 CHANGES IN THE COMPOSITION OF VALENCIA
ORANGES IN COLD STORAGE. (AVERAGES OF
ALL TREATMENTS, PICK II, 1949 FOR SIZE 150 ONLY)

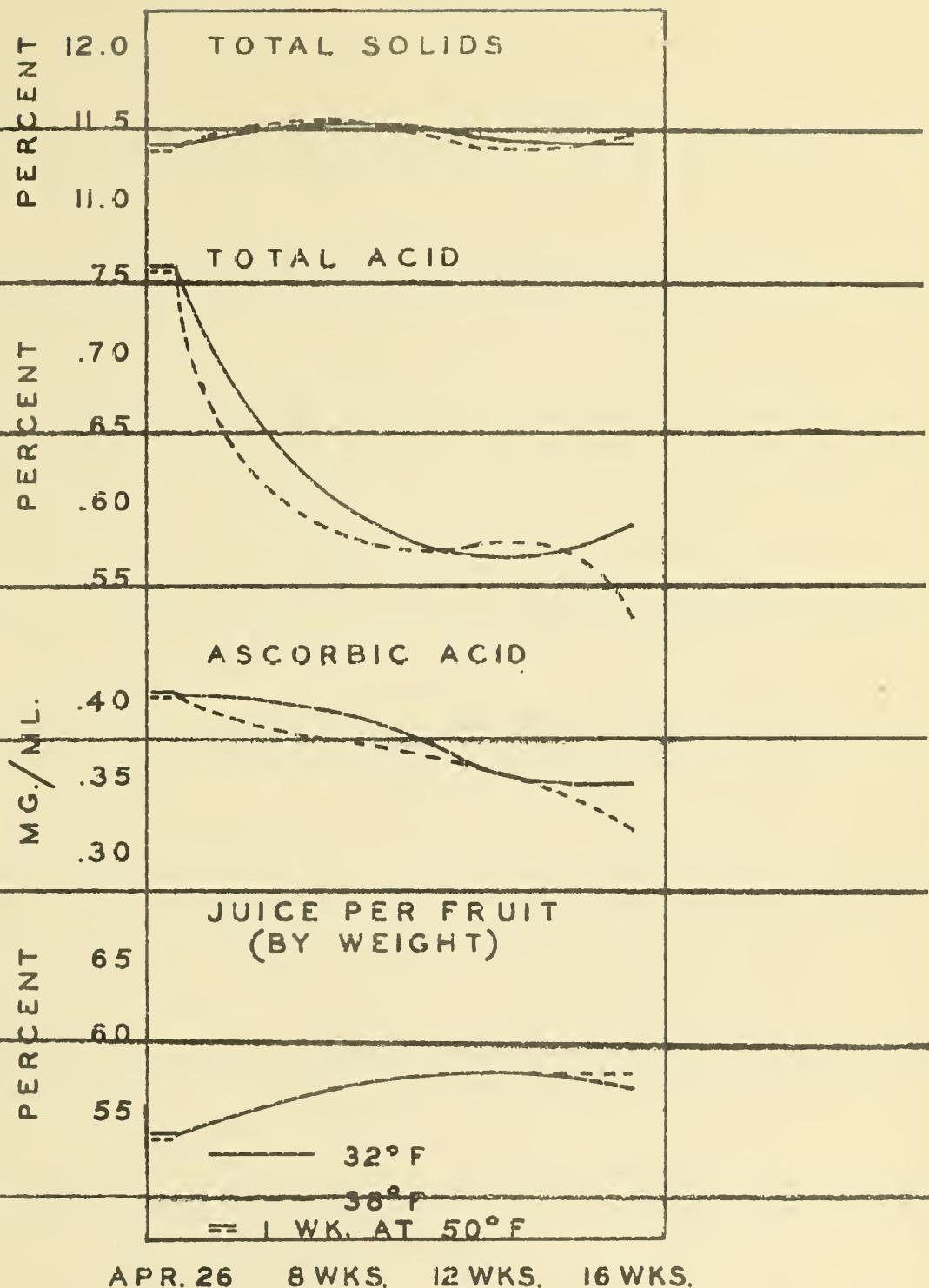


FIG. 15 CHANGES IN THE COMPOSITION OF VALENCIA
ORANGES CURED 1 WEEK AT 50° AND
TRANSFERRED TO COLD STORAGE. (AVERAGES
OF ALL TREATMENTS FOR SIZE 150 ONLY, 1949)

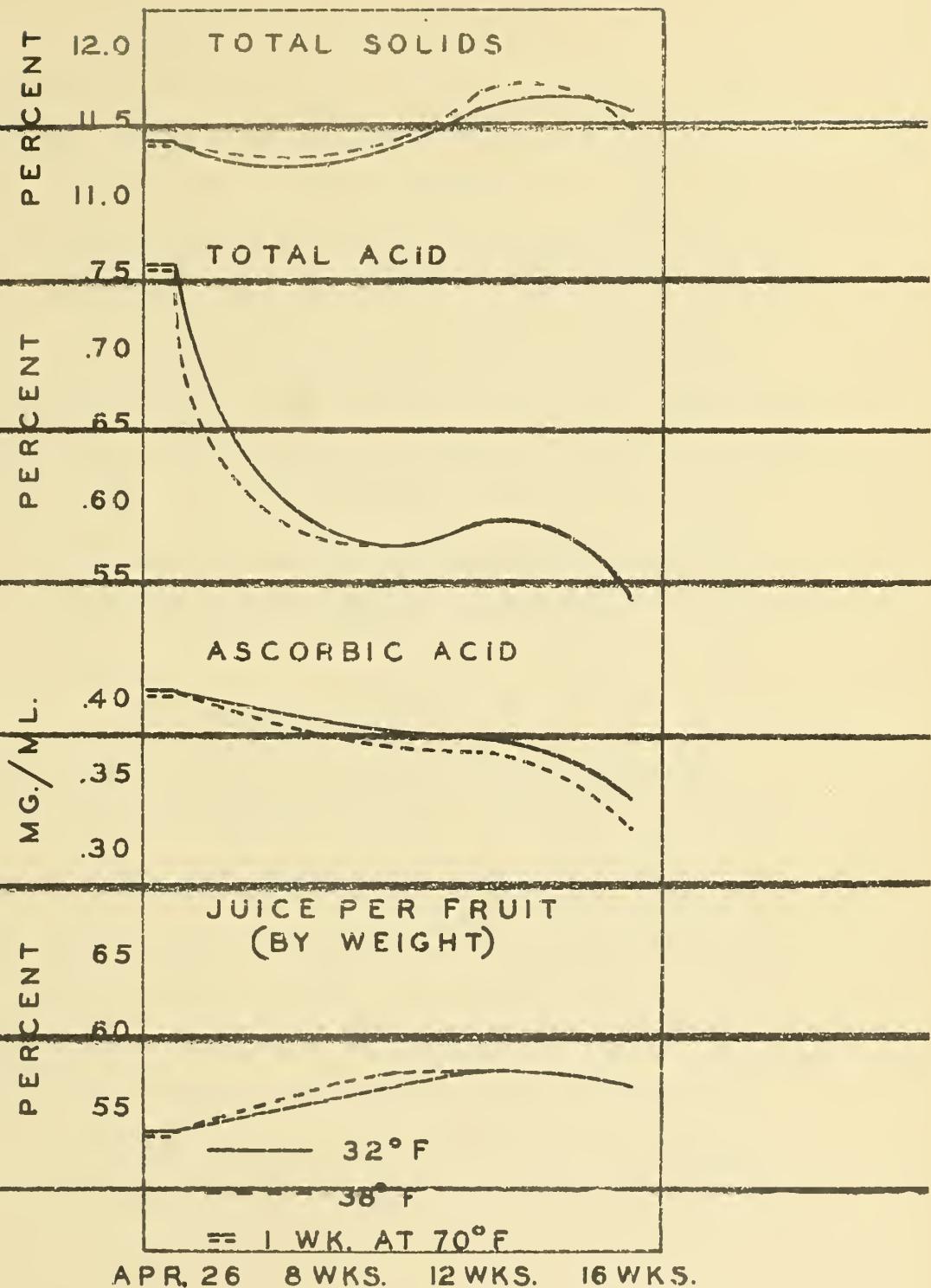


FIG. 16 CHANGES IN THE COMPOSITION OF VALENCIA
ORANGES CURED 1 WEEK AT 70° AND
TRANSFERRED TO COLD STORAGE. (AVERAGES
OF ALL TREATMENTS FOR SIZE 150 ONLY, 1949)

Changes in fruit composition

Chemical analyses were made on the juice of Valencia oranges to determine the changes in the internal composition of the fruit during storage. The results are shown in tables 13 to 24. The general trends for 32° and for 38° storages as shown by the average values of all of the treatments are shown graphically in figures 13, 14, 15, and 16. Most of the chemical constituents show definite trends, while others show small differences due to storage. There was a marked tendency for total acid and ascorbic acid (vitamin C) to decrease, while the percentage of juice per fruit increased slightly. On the other hand, the trend in total solids was somewhat irregular and showed a tendency to increase in some tests (fig. 16) and decrease in others (figs. 13 and 14).

Flavor or taste

Taste tests were made on the juice for each period that the fruit was sampled for chemical analyses. The tests showed that storage for two months at 32° and 38°F. usually did not affect palatability of the juice. At the end of three and four months storage, the juices were usually acceptable, but rated as only "fair," because of slight storage flavors. Three samples of juice from the second picking were regarded as objectionable and the juice scored "poor". They were from fruit that had been in storage four months with prestorage treatments of borax plus diphenyl wraps and phenodor case liners.

Summary

A comparison made between the 1948 and 1949 storage data showed much smaller percentages of decay in 1949.

Maturity of the fruit influenced storage quality in that smaller percentages of decay and better internal quality resulted in fruit from the first picking (April 26) than in that from the second picking (May 23).

Curing at 50° or 70° F. for 1 week did not reduce decay during storage. However, curing did result in a slight lowering of storage pitting.

Better results were obtained from storage when oranges were held at 32° than at 38° F. Phenodor case liners or borax plus diphenyl wraps proved to be better prestorage treatments than plain wraps.

The composition of the fruit was affected during storage. There was a marked tendency for total acid, ascorbic acid and flavor to decrease, while the percentage of juice per fruit increased slightly. The content of total solids was irregular - decreasing slightly in some tests and increasing in others.

Table 1 Orange Storage - Orlando, Florida - 1949
 Orange County Fruit - 8 weeks - First Pick

First Inspection

Second Inspection - 1 wk at 70° F. 2/

Treatment	Storage Temperature	Number of Fruit	Weight Loss	Pitting		Decay		Aging		Pitting		Decay	
				Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate
D	32	326	1.7	0.9	0.6	0.0	0.0	0.0	0.0	5.8	0.6	2.1	0.0
N	32	326	1.4	0.0	1.2	0.0	0.9	0.6	0.3	0.9	0.6	0.9	0.0
P	32	326	1.9	0.3	0.0	0.9	0.0	0.0	0.0	0.6	0.0	1.8	0.0
D	38	326	2.1	1.2	1.5	0.3	0.0	0.3	0.3	3.4	4.0	1.5	0.3
N	38	326	1.5	0.9	1.2	0.9	0.0	0.0	0.0	2.5	0.6	2.1	0.9
P	38	325	1.9	1.2	1.5	1.8	0.0	0.0	0.3	2.8	1.2	1.2	0.3

1/ D - Diphenyl wrap, Borax treated
 N - Phenodor liner - naked fruit
 P - Plain wrap

2/ Decay date, 2nd inspection, cumulative.
 Pitting and aging data, 2nd inspection,
 not cumulative.

Table 2 Orange Storage - Orlando, Florida - 1949
 Orange County Fruit - 12 Weeks - First Pick

First Inspection

Second Inspection - 1 wk at 70° F. 2/

Treatment	Storage Temperature	Number of fruit	Weight loss	Severe	Moderate	Total	Stem End Rot	Penicillium	Pitting		Decay	
									Percent	Percent	Percent	Percent
D	32	325	2.6	2.2	4.0	0.3	0.0	0.3	0.3	9.2	5.8	1.8
N	32	324	1.8	0.9	0.3	2.2	0.6	0.3	0.0	3.4	1.5	2.2
P	32	326	2.3	0.3	0.6	0.0	0.0	0.3	0.0	1.5	0.9	2.8
D	38	350	3.3	4.3	3.4	1.4	0.0	0.0	0.9	4.0	4.0	0.0
N	38	350	1.8	0.9	3.4	0.9	0.0	1.4	1.1	0.9	1.4	0.6
P	38	350	2.9	1.4	1.1	0.9	0.0	0.6	0.3	1.4	1.4	0.6

1/ D - Diphenyl wrap, Borax treated
 N - Phenodor liner - naked fruit
 P - Plain wrap

2/ Decay data, 2nd inspection, cumulative.
 Pitting and aging data, 2nd inspection,
 not cumulative.

Table 3 Orange Storage - Orlando, Florida - 1949
Orange County Fruit - 16 weeks - First Pick

First Inspection

Second Inspection - 1 wk at 70° F. 2/

Treatment	Storage Temperature	Number of fruit	Weight loss	Weight	Severe	Moderate	Total	Stem End	Rot	Penicillium	Decay	
											Percent	Percent
D	32	326	3.3	4.0	3.1	0.9	0.0	0.3	0.3	0.0	7.4	4.3
N	32	326	2.7	3.4	2.8	0.3	0.0	0.0	0.0	0.0	0.6	2.8
P	32	326	3.6	4.9	1.8	0.9	0.3	0.0	0.0	0.0	2.5	3.7
D	38	350	5.3	4.6	2.9	0.3	0.9	0.3	6.3	5.1	0.6	1.1
N	38	350	3.9	2.9	2.0	0.6	0.0	0.0	15.1	13.4	0.6	0.6
P	38	348	6.5	11.8	6.3	0.6	0.6	0.0	6.6	6.0	0.3	1.4

1/ D - Diphenyl wrap, Borax treated
N - Phenodor liner - naked fruit
P - Plain wrap

2/ Decay date, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

Table 4 Orange Storage - Orlando, Florida - 1949
 Orange County Fruit - 8 weeks - Second Pick

First Inspection

Second Inspection - 1 wk at 700 F. 2/

Treatment	Storage Temperature	Number of Fruits	Wet weight loss	Aging		Pitting		Decay		Penicillium	
				Percent	Pct.	Percent	Pct.	Percent	Pct.	Percent	Pct.
D	32	326	1.4	0.0	0.0	0.0	0.0	0.0	0.0	4.0	2.1
N	32	326	1.3	0.0	0.0	0.3	0.0	0.3	0.0	3.1	0.3
P	32	326	1.8	0.0	0.0	0.6	0.0	0.3	0.9	9.5	7.4
D	38	326	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N	38	326	1.7	0.6	1.2	0.0	0.0	0.6	0.3	0.0	0.0
P	38	326	2.6	0.0	0.6	0.6	0.0	0.9	0.6	0.0	0.0
D	32	326	1.4	0.0	0.0	0.0	0.0	0.0	0.0	4.0	2.1
N	32	326	1.3	0.0	0.0	0.3	0.0	0.3	0.0	3.1	0.3
P	32	326	1.8	0.0	0.0	0.6	0.0	0.3	0.9	9.5	7.4
D	38	326	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N	38	326	1.7	0.6	1.2	0.0	0.0	0.6	0.3	0.0	0.0
P	38	326	2.6	0.0	0.6	0.6	0.0	0.9	0.6	0.0	0.0

1/ D - Diphenyl wrap, Borax treated
 N - Phenodor liner,- naked fruit
 P - Plain wrap

Decay data, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

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Table 5 Orange Storage - Orlando, Florida - 1949
Orange County Fruit - 12 weeks - Second Pick

First Inspection

Second Inspection - 1 wk at 70° F. 2/

Treatment	Storage Temperature	Number of fruit	Weight loss	Severe	Moderate	Total	Stem End Rot	Penicillium	Decay		
									Percent	Percent	Percent
D	32	326	2.7	0.3	0.0	0.6	0.0	0.0	0.3	1.8	0.0
N	32	326	2.2	1.2	0.6	0.0	0.0	0.0	0.6	0.9	0.0
P	32	326	2.9	0.3	0.6	0.0	0.0	0.0	0.5	0.9	0.3
D	38	350	3.8	0.3	0.6	0.0	0.0	1.1	1.1	0.3	0.0
N	38	350	2.8	0.3	0.9	0.6	0.3	1.4	0.9	0.3	0.0
P	38	350	4.1	3.7	3.1	0.3	0.0	1.4	1.4	0.0	0.0

1/ Decay data, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

2/ Decay data, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

Table 6. Orange Store - Orlando - 16 weeks - Second Pick
Orange County, Florida - 1946

First Inspection

Second Inspection - 1 wk at 700 F. 2

Treatment	Storage Temperature	Number of fruits	Weight loss	Pitting		Aging		Pitting		Decay		Percent
				SLight	Severe	SLight	Severe	SLight	Severe	SLight	Severe	
D	32	326	3.9	0.6	0.9	0.0	0.3	0.6	0.0	5.2	4.0	1.2
N	32	326	2.8	0.0	3.4	1.2	0.9	0.0	0.6	5.2	5.2	2.1
P	32	326	3.9	1.5	0.3	0.6	0.3	0.0	0.3	1.5	0.6	2.1
D	38	350	5.5	1.1	1.7	0.9	0.6	0.3	16.6	11.4	0.0	0.3
N	38	349	4.0	1.1	0.6	0.0	0.0	0.0	23.5	20.1	0.0	0.3
P	38	350	6.2	1.4	3.4	0.3	0.0	0.0	38.3	33.7	0.3	0.6
D	32	326	3.9	1.5	0.6	0.0	0.3	0.6	0.0	5.2	4.0	1.2
N	32	326	2.8	0.0	3.4	1.2	0.9	0.0	0.6	5.2	5.2	2.1
P	32	326	3.9	1.5	0.3	0.6	0.3	0.0	0.3	1.5	0.6	2.1
D	38	350	5.5	1.1	1.7	0.9	0.6	0.3	16.6	11.4	0.0	0.3
N	38	349	4.0	1.1	0.6	0.0	0.0	0.0	23.5	20.1	0.0	0.3
P	38	350	6.2	1.4	3.4	0.3	0.0	0.0	38.3	33.7	0.3	0.6

1/ D - Diphenyl wrap, Borax treated
N - Phenodor liner - naked fruit
P - Plain wrap

2/ Decay data, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

Table 7. Orange Storage - Orlando, Florida - 1949
Orange County Fruit - 1 week at 50° F. + 8 weeks

First Inspection

Second Inspection - 1 wk at 70° F. 2/

Treatment	Temperature	Number of fruit	Weight loss	Severe	Moderate	Total	Penicillium	Aging		Decay		Pitting		Decay	
								Percent							
D	32	326	2.7	0.6	1.2	1.5	0.0	0.0	0.6	0.0	4.6	2.5	1.8	0.3	0.0
N	32	326	1.9	0.3	0.6	0.9	0.0	0.0	2.1	1.5	0.9	2.1	0.9	0.0	0.0
P	32	350	2.5	1.4	2.0	0.3	0.3	0.0	0.9	0.3	3.7	2.0	1.1	0.3	0.3
D	38	350	2.7	4.0	0.9	0.9	0.0	0.0	0.0	0.0	2.9	2.6	0.6	0.3	0.6
N	38	326	1.8	0.6	0.3	0.9	0.0	0.0	1.5	0.6	0.6	1.2	0.3	0.0	0.0
P	38	326	2.5	3.7	3.1	1.5	0.0	0.0	1.5	0.3	0.3	2.8	0.9	0.0	0.0

1/ D - Diphenyl wrap, Borax treated
N - Phenodor liner - naked fruit
P - Plain wrap

2/ Decay data, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

Table 8 Orange Storage - Orlando, Florida - 1949
Orange County Fruit - 1 week at 50° F. + 12 weeks

First Inspection

Second Inspection - 1 week at 70° F. 2/

Treatment	Storage Temperature	Number of fruit	Weight	Total	Severe	Moderate	Slight	Total	Severe	Moderate	Slight	Total	Severe	Moderate	Slight	Percent	Percent	Percent	Penicillium	Rot and stem end	Stem end	Rot	Penicillium
D	32	326	2.7	2.5	5.5	3.4	0.6	0.0	0.0	0.0	0.0	7.4	3.7	0.3	0.0	0.3	20.9	16.9	1.6				
H	32	324	2.4	3.4	1.5	0.0	0.6	0.0	0.0	0.0	0.0	3.1	2.8	1.2	0.3	0.0	16.7	12.3	3.4				
P	32	350	2.8	7.1	3.4	3.1	0.3	0.0	2.6	1.4	0.6	5.1	3.7	1.7	1.1	0.9	34.3	31.1	2.3				
D	38	325	3.1	0.3	0.9	0.0	0.0	0.0	0.9	0.0	0.0	4.9	1.5	1.6	0.0	0.0	32.0	29.5	0.9				
H	38	350	2.4	1.7	0.3	1.7	0.0	0.0	3.7	2.0	1.1	2.3	0.6	0.3	0.0	0.0	47.4	40.3	4.3				
P	38	323	3.6	4.0	8.4	0.3	0.0	0.0	8.7	7.1	1.2	1.9	1.2	0.3	0.0	0.0	65.3	54.5	6.2				

1/ D - Diphenyl wrap, Borax treated
H - Phenodor liner - naked fruit
P - Plain wrap

2/ Decay data, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

Table 9. Orange Storage - Orlando, Florida - 1949
 Orange County Fruit - 1 week at 50° F + 16 weeks

First Inspection

Second Inspection - 1 wk at 700° F. 2/

Treatment	Storage Temperature	Number of Fracture	Weight Loss	Percent	Aging		Pitting		Decay		Percent	
					Total	Severe	SLight	Moderate	Total	Severe	SLight	
D	32	350	3.8	2.9	0.3	0.9	0.0	1.4	0.9	0.0	6.6	2.0
D	32	326	2.8	2.1	1.8	1.2	0.9	0.0	3.4	0.6	0.6	25.4
D	32	326	4.2	4.3	1.5	0.0	0.3	0.0	1.2	0.9	0.6	17.6
D	38	326	5.7	2.1	0.6	0.3	0.0	19.0	17.2	0.9	1.2	0.0
D	38	350	4.4	1.7	1.1	0.9	0.6	0.0	22.9	21.7	0.3	0.0
D	38	326	6.4	2.1	4.6	0.0	0.0	0.0	39.3	37.1	1.2	0.0
P	32	350	2.8	2.1	1.8	1.2	0.9	0.0	3.4	0.6	0.6	23.0
P	32	326	4.2	4.3	1.5	0.0	0.3	0.0	1.2	0.9	0.6	14.4
P	32	326	5.7	2.1	0.6	0.3	0.0	19.0	17.2	0.9	1.2	0.0
P	38	326	4.4	1.7	1.1	0.9	0.6	0.0	22.9	21.7	0.3	0.0
P	38	350	6.4	2.1	4.6	0.0	0.0	0.0	39.3	37.1	1.2	0.0
P	38	326	5.7	2.1	0.6	0.3	0.0	19.0	17.2	0.9	1.2	0.0
P	46	350	2.8	2.1	1.8	1.2	0.9	0.0	3.4	0.6	0.6	25.4
P	46	326	4.2	4.3	1.5	0.0	0.3	0.0	1.2	0.9	0.6	17.6
P	46	326	5.7	2.1	0.6	0.3	0.0	19.0	17.2	0.9	1.2	0.0
P	46	350	4.4	1.7	1.1	0.9	0.6	0.0	22.9	21.7	0.3	0.0
P	46	326	6.4	2.1	4.6	0.0	0.0	0.0	39.3	37.1	1.2	0.0
P	46	350	5.7	2.1	0.6	0.3	0.0	19.0	17.2	0.9	1.2	0.0

1/ D - Diphenyl wrap, Borax treated
 N - Phenodor liner - naked fruit
 P - Plain wrap

2/ Decay data, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

2/ Decay data, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

Table 10 Orange Storage - Orlando, Florida - 1949
Orange County Fruit - 1 week at 70° F + 8 weeks

First Inspection

Second Inspection - 1 wk at 70° F. 2/

L/ D - Diphenyl wrap, Borax treated
 N - Phenodor liner - naked fruit
 P - Plain wrap

2/ Decay data, 2nd inspection, cumulative.
Pitting and aging data, 2nd inspection,
not cumulative.

Table 11. Orange Storage - Orlando, Florida - 1949
 Orange County Fruit - 1 week at 70° F + 12 weeks

First Inspection

Second Inspection - 1 wk at 70° F. 2/

Treatment	Storage Temperature °F.	Number of Fruit	Aging			Pitting			Decay			Aging			Pitting			Decay		
			Slight Percent	Severe Percent	Slight Percent	Moderate Percent	Severe Percent	Total Percent	Stem Rot	End Rot	Penicillium	Slight Percent	Severe Percent	Slight Percent	Moderate Percent	Severe Percent	Total Percent	Stem Rot	End Rot	Penicillium
D	32	325	2.9	1.2	0.0	0.0	0.0	1.5	1.2	0.3	1.5	1.5	1.2	0.6	0.3	0.3	21.3	15.1	4.0	
N	32	350	2.3	0.9	2.9	0.0	0.0	2.6	2.6	0.0	1.4	0.3	0.9	0.3	0.0	0.0	19.4	18.0	1.1	
P	32	326	3.8	2.8	6.1	0.0	0.0	8.6	7.4	0.3	0.6	0.6	0.0	0.0	0.0	0.0	44.5	41.4	1.5	
D	38	324	3.6	0.6	0.0	1.2	0.0	0.6	0.6	0.0	1.2	0.3	0.3	0.0	0.3	0.3	25.3	13.6	5.2	
N	38	350	2.9	0.9	0.0	0.0	0.0	9.1	7.1	1.7	0.3	0.0	0.0	0.0	0.0	0.0	47.4	40.4	4.0	
P	38	326	3.6	2.1	1.2	0.0	0.3	23.9	21.8	1.8	0.3	0.3	0.9	0.0	0.0	0.0	63.8	54.6	4.3	

1/ D - Diphenyl wrap, Borax treated
 N - Phenodor liner - naked fruit
 P - Plain wrap

2/ Decay data, 2nd inspection, cumulative.
 Pitting and aging data, 2nd inspection,
 not cumulative.

Table 12 Orange Storage - Orlando, Florida - 1949
 Orange County Fruit - 1 week at 70° F + 16 weeks

First Inspection

Second Inspection - 1 wk at 700° T. 2/

Treatment	Storage Temperature	Number of fruits	Wet weight loss	Percent	Aging		Pitting		Decay		Leaching		Pitting		Decay		Penetration	
					0°F.	32°F.	32°F.	32°F.	32°F.	32°F.	32°F.	32°F.	32°F.	32°F.	32°F.	32°F.	32°F.	
D	32	326	4.3	0.3	0.6	0.0	0.3	0.3	1.2	0.6	0.3	0.9	0.6	0.3	0.0	0.0	7.4	
N	32	326	3.0	2.1	0.9	0.0	0.0	0.0	4.3	2.8	0.9	1.5	0.6	0.3	0.0	24.8	14.4	
K	32	326	5.0	4.0	11.0	0.0	0.0	0.0	13.8	12.0	1.8	1.5	0.0	0.3	0.0	31.3	23.9	
P	32	326	6.0	0.3	1.2	0.0	0.3	0.0	15.0	12.9	0.3	0.0	0.0	0.0	0.0	61.7	56.7	
D	38	326	6.0	5.4	0.9	0.9	0.6	0.0	37.1	30.6	4.3	0.0	0.3	0.0	0.0	46.9	32.8	
N	38	350	6.3	6.3	0.3	0.9	0.9	0.0	50.9	47.5	1.5	0.0	0.3	0.0	0.0	70.6	56.3	
K	38	326	6.3	6.3	0.3	0.9	0.9	0.0	50.9	47.5	1.5	0.0	0.3	0.0	0.0	78.2	67.5	
P	38	326	6.3	6.3	0.3	0.9	0.9	0.0	50.9	47.5	1.5	0.0	0.3	0.0	0.0	78.2	67.5	

- D - Diphenyl wrap, Borax treated
- N - Phenodor liner, - naked fruit
- P - Plain wrap

2/ Decay data, 2nd inspection, cumulative.
Pitting and aging data 2nd inspection,
not cumulative.

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Table 11. Changes in the composition of Valencia oranges (First Pick - April 26, 1949) using borax-diphengyl wraps. Storage consisted of 8, 12, and 16 weeks at either 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was Juice pct.	Ascorbic Acid per Milliliter mg.	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Paste
At Time of Storage	139	54	.39	12.00	.64	18.75	acceptable	none	good
	151	60	.32	11.66	.56	20.82	do	slight	fair
	146	59	.32	11.69	.57	20.51	do	do	do
	148	59	.29	12.07	.60	20.12	do	do	do
At Time of Storage	139	54	.39	12.00	.64	18.75	acceptable	none	good
	143	58	.36	12.06	.60	20.10	do	do	do
	142	58	.31	12.12	.53	22.87	do	slight	poor
	143	59	.29	12.17	.54	22.54	do	do	fair
8 wks at 32° F.	139	54	.39	12.00	.64	18.75	acceptable	none	good
	143	58	.36	12.06	.60	20.10	do	do	do
	142	58	.31	12.12	.53	22.87	do	slight	poor
	143	59	.29	12.17	.54	22.54	do	do	fair
12 wks at 32° F.	139	54	.39	12.00	.64	18.75	acceptable	none	good
	143	58	.36	12.06	.60	20.10	do	do	do
	142	58	.31	12.12	.53	22.87	do	slight	poor
	143	59	.29	12.17	.54	22.54	do	do	fair
16 wks at 32° F.	139	54	.39	12.00	.64	18.75	acceptable	none	good
	143	58	.36	12.06	.60	20.10	do	do	do
	142	58	.31	12.12	.53	22.87	do	slight	poor
	143	59	.29	12.17	.54	22.54	do	do	fair
At Time of Storage	139	54	.39	12.00	.64	18.75	acceptable	none	good
	143	58	.36	12.06	.60	20.10	do	do	do
	142	58	.31	12.12	.53	22.87	do	slight	poor
	143	59	.29	12.17	.54	22.54	do	do	fair

Table 14. Changes in the composition of Valencia oranges (First Pick - April 26, 1949) using phenodor liners. Storage consisted of 8, 12, and 16 weeks at either 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was Juice pct.	Ascorbic Acid per Milliliter mg.	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Taste
At Time of Storage									
8 wks at 32° F.	153	58	.37	11.97	.71	16.86	acceptable	none	good
12 wks at 32° F.	153	58	.36	11.11	.56	19.84	do	slight	do
16 wks at 32° F.	148	59	.32	11.29	.27	19.81	do	none	do
At Time of Storage	146	57	.28	11.47	.55	20.85	do	slight	fair
8 wks at 38° F.	153	58	.37	11.97	.71	16.86	acceptable	none	good
12 wks at 38° F.	148	59	.39	11.96	.56	21.36	do	do	do
16 wks at 38° F.	152	59	.34	11.52	.55	20.95	do	slight	fair
	137	56	.29	11.57	.52	22.25	do	do	do

Table 15. Changes in the composition of Valencia oranges (First Pick - April 26, 1949) using plain wraps.
 Storage consisted of 8, 12, and 16 weeks at either 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was Juice pct.	Ascorbic Acid per Milliliter	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Taste
At Time of Storage	153	58	.37	11.97	.71	16.86	acceptable	none	good
8 wks at 32° F.	153	61	.32	11.51	.53	21.72	do	do	do
12 wks at 32° F.	154	61	.31	11.74	.55	21.35	do	do	fair
16 wks at 32° F.	143	57	.32	11.97	.57	21.00	do	slight	do
At Time of Storage	153	58	.37	11.97	.71	16.86	acceptable	none	good
8 wks at 38° F.	149	59	.38	12.06	.58	20.79	do	do	do
12 wks at 38° F.	145	58	.36	12.09	.57	21.21	do	do	fair
16 wks at 38° F.	137	58	.30	12.07	.54	22.35	do	slight	

Table 16 Changes in the composition of Valencia oranges (Second Pick - May 23, 1949) using borax - diphenyl wraps. Storage consisted of 8, 12, and 16 weeks at either 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was juice pct.	Ascorbic Acid per Milliliter mg.	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Taste
At Time of Storage	167	61	.33	11.52	.50	23.04	acceptable	none	fair
	142	58	.32	12.89	.59	21.85	do	do	good
	146	58	.28	12.10	.52	23.27	do	slight	fair
	137	57	.28	12.67	.52	24.37	not acceptable	objectionable	poor
8 wks at 32° F.	167	61	.33	11.52	.50	23.04	acceptable	none	fair
	142	57	.31	12.26	.49	25.02	do	do	do
	141	55	.25	11.74	.41	28.63	do	do	do
	136	58	.26	11.92	.43	27.72	not acceptable	objectionable	poor
12 wks at 32° F.	167	61	.33	11.52	.50	23.04	acceptable	none	fair
	142	57	.31	12.26	.49	25.02	do	slight	do
	141	55	.25	11.74	.41	28.63	do	do	do
	136	58	.26	11.92	.43	27.72	not acceptable	objectionable	poor
16 wks at 32° F.	167	61	.33	11.52	.50	23.04	acceptable	none	fair
	142	57	.31	12.26	.49	25.02	do	slight	do
	141	55	.25	11.74	.41	28.63	do	do	do
	136	58	.26	11.92	.43	27.72	not acceptable	objectionable	poor
At Time of Storage	167	61	.33	11.52	.50	23.04	acceptable	none	fair
	142	57	.31	12.26	.49	25.02	do	slight	do
	141	55	.25	11.74	.41	28.63	do	do	do
	136	58	.26	11.92	.43	27.72	not acceptable	objectionable	poor
8 wks at 38° F.	167	61	.33	11.52	.50	23.04	acceptable	none	fair
	142	57	.31	12.26	.49	25.02	do	slight	do
	141	55	.25	11.74	.41	28.63	do	do	do
	136	58	.26	11.92	.43	27.72	not acceptable	objectionable	poor
12 wks at 38° F.	167	61	.33	11.52	.50	23.04	acceptable	none	fair
	142	57	.31	12.26	.49	25.02	do	slight	do
	141	55	.25	11.74	.41	28.63	do	do	do
	136	58	.26	11.92	.43	27.72	not acceptable	objectionable	poor
16 wks at 38° F.	167	61	.33	11.52	.50	23.04	acceptable	none	fair
	142	57	.31	12.26	.49	25.02	do	slight	do
	141	55	.25	11.74	.41	28.63	do	do	do
	136	58	.26	11.92	.43	27.72	not acceptable	objectionable	poor

Table 17. Changes in the composition of Valencia oranges (Second Pick - May 23, 1949) using phenodor liners. Storage consisted of 8, 12, and 16 weeks at either 32° or 39° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was Juice Pet.	Ascorbic Acid per Milliliter mg.	Total Solids Solids% Pct.	Total Acid Pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Taste
At Time of Storage 8 wks at 320 F.	166	60	.28	12.07	.57	21.18	acceptable	none	fair
	146	57	.29	11.53	.47	24.53	do	do	do
	144	57	.25	11.19	.38	29.45	do	slight	do
	135	57	.24	11.77	.42	28.02	do	do	do
At Time of Storage 12 wks at 320 F.	166	60	.28	12.07	.57	21.18	acceptable	none	fair
	142	57	.33	11.71	.43	27.23	do	slight	do
	141	57	.26	11.44	.43	26.60	do	do	do
	137	56	.24	11.52	.38	30.32	not acceptable	objec- tionable	poor
At Time of Storage 16 wks at 320 F.	166	60	.28	12.07	.57	21.18	acceptable	none	fair
	142	57	.33	11.71	.43	27.23	do	slight	do
	141	57	.26	11.44	.43	26.60	do	do	do
	137	56	.24	11.52	.38	30.32	not acceptable	objec- tionable	poor

Table 18 Changes in the composition of Valencia oranges (Second Pick - May 23, 1949) using plain wraps.
Storage consisted of 8, 12, and 16 weeks at either 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was Juice pct.	Ascorbic Acid per Milliliter mg.	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio		Palatability Rating	
						Flavor Rating	Storage Flavor	Storage Flavor	Taste
<i>At Time of Storage</i>									
8 wks at 32° F.	166	60	.28	12.07	.57	21.18	acceptable	none	fair
137	56	.29	11.58	.48	24.13	do	do	do	good
140	57	.25	11.74	.43	27.30	do	slight	do	fair
134	55	.25	11.92	.46	25.91	do	do	do	do
<i>At Time of Storage</i>									
8 wks at 38° F.	166	60	.28	12.07	.57	21.18	acceptable	none	fair
145	57	.27	11.86	.45	26.36	do	do	do	good
133	56	.27	12.04	.45	26.76	do	slight	do	fair
130	55	.24	11.87	.38	31.24	do	do	do	do

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Table 19. Changes in the composition of Valencia oranges (Picked April 18, 1949) using borax-diphenyl wraps. Storage consisted of 7 days at 50° F., plus 8, 12, and 16 weeks at either 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was Juice pct.	Ascorbic Acid per Milliliter mg.	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Taste
At Time of Storage									
8 wks at 32° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
12 wks at 32° F.	142	58	.41	11.37	.59	19.27	do	alright	fair
16 wks at 32° F.	134	57	.38	11.53	.59	19.54	do	do	do
	137	57	.35	10.93	.58	18.84	do	do	do
At Time of Storage									
8 wks at 38° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
12 wks at 38° F.	146	58	.39	11.39	.58	19.64	do	slight	fair
16 wks at 38° F.	139	57	.37	11.18	.57	19.61	do	none	good
	135	58	.32	11.47	.55	20.85	do	slight	fair

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Table 20 Changes in the composition of Valencia oranges (picked April 18, 1949) using phenoodor liners.
 Storage consisted of 7 days at 50° F., plus 8, 12, and 16 weeks at either
 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit <u>ml.</u>	Weight of Fruit that was Juice <u>pct.</u>	Ascorbic Acid per Milliliter <u>mg.</u>	Total Solids <u>pct.</u>	Total Acid <u>pct.</u>	Palatability Rating			
						Solids-Acid Ratio	Flavor Rating	Storage Flavor	Taste
At Time of Storage									
8 wks at 32° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
12 wks at 32° F.	137	56	.38	11.52	.60	19.20	do	do	do
16 wks at 32° F.	139	58	.38	11.45	.59	19.41	do	slight	fair
	142	57	.34	11.50	.56	20.54	do		
At Time of Storage									
8 wks at 38° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
12 wks at 38° F.	142	57	.39	11.74	.62	18.94	do	slight	fair
16 wks at 38° F.	146	60	.33	11.37	.57	19.95	do	none	do
	142	58	.31	11.44	.51	22.43	do	slight	do

Table 21 Changes in the composition of Valencia oranges (Picked April 18, 1949) using plain wraps.
 Storage consisted of 7 days at 50° F., plus 8, 12, and 16 weeks at either 32° or
 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was Juice pct.	Ascorbic Acid per Milliliter mg.	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Taste
At Time of Storage 8 wks at 32° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
	142	57	.42	11.72	.64	18.31	do	do	fair
	143	59	.32	11.40	.52	21.92	do	slight	do
	140	58	.37	11.80	.62	19.03	do	do	do
At Time of Storage 12 wks at 32° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
	141	57	.37	11.59	.58	19.98	do	slight	fair
	139	57	.38	11.57	.59	19.61	do	do	do
	130	57	.32	11.47	.54	21.24	do	do	do
At Time of Storage 16 wks at 32° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
	141	57	.37	11.59	.58	19.98	do	slight	fair
	139	57	.38	11.57	.59	19.61	do	do	do
	130	57	.32	11.47	.54	21.24	do	do	do

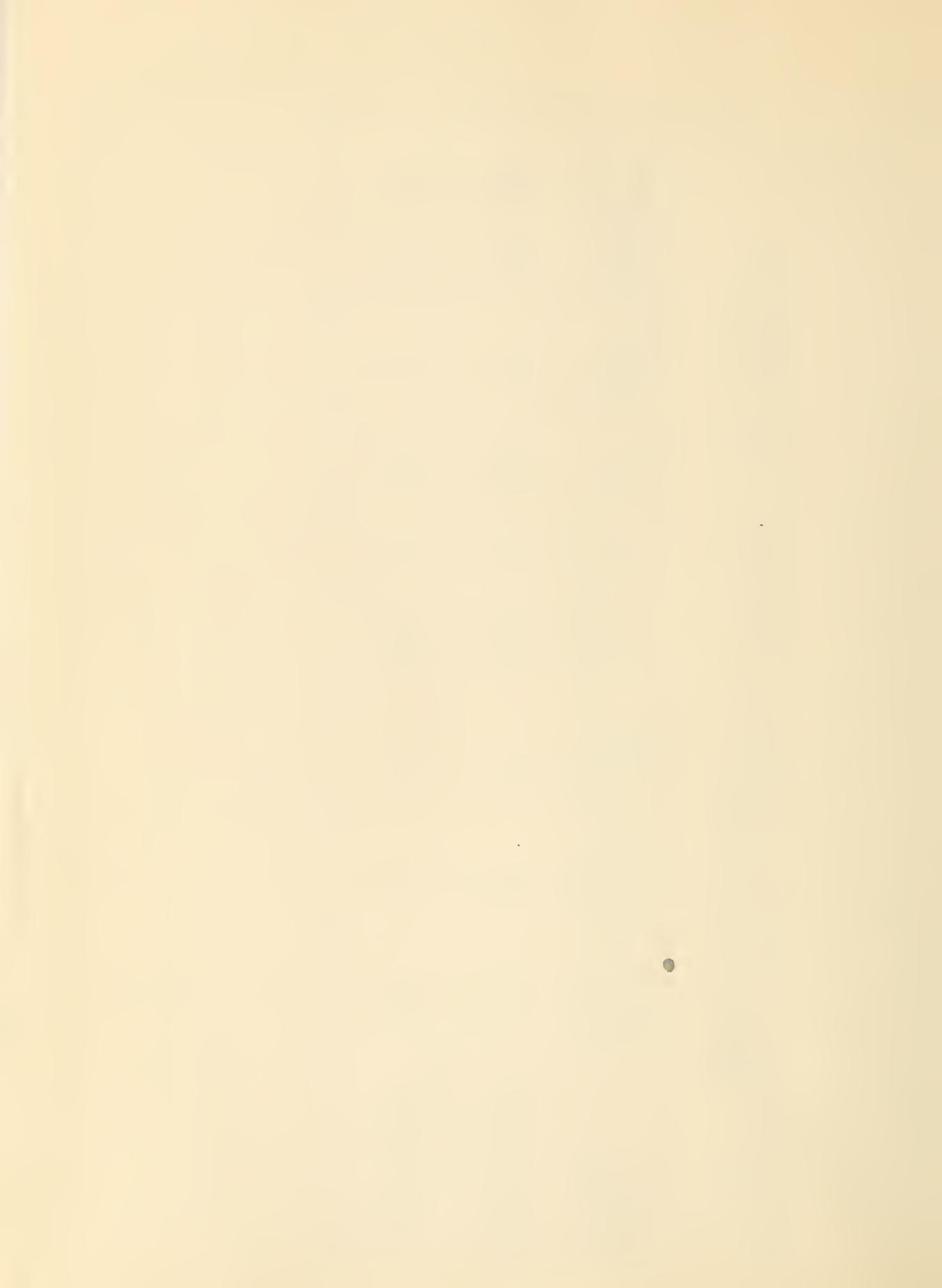


Table 22 Changes in the composition of Valencia oranges (Picked April 18, 1949) using borax-diphenyl wraps. Storage consisted of 7 days at 70° F., plus 8, 12, and 16 weeks at either 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice Per Fruit ml.	Weight of Fruit that was Juice pct.	Ascorbic Acid per Milliliter mg.	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Taste
At Time of Storage									
8 wks at 32° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
12 wks at 32° F.	144	56	.37	10.84	.55	19.71	do	slight	fair
16 wks at 32° F.	142	58	.40	11.53	.61	18.90	do	do	do
	140	57	.32	11.19	.51	21.94	do	do	do
At Time of Storage									
8 wks at 38° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
12 wks at 38° F.	146	58	.39	11.14	.58	19.21	do	slight	fair
16 wks at 38° F.	142	59	.37	11.66	.62	18.81	do	do	do
	138	56	.34	11.34	.57	19.89	do	do	do

Table 27. Changes in the composition of Valencia oranges (Picked April 18, 1949) using phenodor liners.
 Storage consisted of 7 days at 70° F., plus 8, 12, and 16 weeks at either
 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was Juice pct.	Ascorbic Acid per Milliliter mg.	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Taste
<u>At Time of Storage</u>									
8 wks at 32° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
12 wks at 32° F.	141	57	.40	11.44	.59	19.39	do	do	do
16 wks at 32° F.	145	58	.35	11.42	.57	20.04	do	slight	do
	138	57	.35	12.13	.56	21.66	do	do	fair
<u>At Time of Storage</u>									
8 wks at 38° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
12 wks at 38° F.	147	58	.35	11.14	.55	20.25	do	slight	fair
16 wks at 38° F.	138	58	.35	11.49	.56	20.52	do	do	do
	137	58	.31	11.45	.53	21.60	do	do	do

Table 24 Changes in the composition of Valencia oranges (Picked April 18, 1949) using plain wraps.
 Storage consisted of 7 days at 70° F., plus 8, 12, and 16 weeks at either 32° or 38° F., plus 7 days at 70° F.

Storage Treatment	Volume of Juice per Fruit ml.	Weight of Fruit that was Juice pct.	Ascorbic Acid per Milliliter ml.	Total Solids pct.	Total Acid pct.	Solids-Acid Ratio	Palatability Rating		
							Flavor Rating	Storage Flavor	Taste
<i>At Time of Storage</i>									
8 wks at 32° F.	141	54	.41	11.40	.76	15.00	acceptable	none	good
12 wks at 32° F.	139	56	.41	11.49	.64	17.95	do	do	do
16 wks at 32° F.	138	58	.39	11.98	.59	20.31	do	do	do
<i>At Time of Storage</i>									
8 wks at 38° F.	139	57	.35	11.53	.56	20.59	do	slight	fair
12 wks at 38° F.	139	54	.41	11.40	.76	15.00	acceptable	none	good
16 wks at 38° F.	133	56	.32	11.72	.52	22.54	do	slight	fair

